R E P O R T R E S U M E S

ED 013 470 CG 000 927

THE PREDICTION OF CREATIVITY AND ACADEMIC ACHIEVEMENT FROM A CONCRETE PERCEPTUAL-COGNITIVE TASK.

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PUB DATE 67

EDRS PRICE MF-$0.25 HC-$0.60 15P.

DESCRIPTORS- *TEST VALIDITY, TEST RELIABILITY, *PREDICTIVE ABILITY (TESTING), *COGNITIVE TESTS, INTELLIGENCE TESTS, *ELEMENTARY GRADES, RESEARCH PROJECTS, STATISTICAL ANALYSIS, ACADEMIC ACHIEVEMENT, *CREATIVITY, INTELLIGENCE QUOTIENT, DUNNS OBJECT SORTING TASK, PEARSON PRODUCT MOMENT CORRELATIONS, STANFORD BINET INTELLIGENCE TEST, WECHSLER INTELLIGENCE SCALE FOR CHILDREN, CALIFORNIA ACHIEVEMENT TEST BATTERY, LORRANCE TEST, USES FOR THINGS TEST,

THE RELATIVE EFFECTIVENESS OF TASK SCORES VERSUS IQ AS PREDICTORS OF ACADEMIC ACHIEVEMENT WAS INVESTIGATED, AND THE CORRELATIONS BETWEEN TASK SCORES AND IQ RE-EXAMINED. SUBJECTS WERE 99 UPPER-MIDDLE CLASS ELEMENTARY SCHOOL CHILDREN WITH A MEAN STANFORD-BINET IQ OF 126 (SD EQUALS 19). THE INSTRUMENTS USED WERE DUNN'S OBJECT SORTING TASK (OST), STANFORD BINET IQ SCORES, WECHSLER INTELLIGENCE SCALE FOR CHILDREN (WISC) VOCABULARY TEST, THE CALIFORNIA ACHIEVEMENT TEST BATTERY (CATB), THE TORRANCE TESTS, AND, FOR YOUNGER CHILDREN, THE USES FOR THINGS TEST. CORRELATION AND MULTIPLE REGRESSION ANALYSES WERE CONDUCTED. IT WAS EXPECTED THAT/ (1) SORTING FLUENCY, SPEED AND QUALITY OF THE VERBAL EXPLANATION OF CLASSIFICATORY CONCEPTS WOULD PREDICT ACADEMIC ACHIEVEMENT, (2) THE NUMBER OF POSITIVE SORTS AND MEAN VERBALIZATION SCORES WOULD CORRELATE WITH IQ, AND (3) OST FLUENCY, FLEXIBILITY, AND ORIGINALITY WOULD CORRELATE WITH THEIR RESPECTIVE TORRANCE SCORES. ALL THREE HYPOTHESES WERE SUPPORTED. THE RESULTS INDICATE THE OST MAY BE USEFUL IN DETECTING DIFFERENCES IN APPARENTLY HOMOGENEOUS IQ GROUPS. A STRONG PREDICTIVE RELATIONSHIP BETWEEN PERFORMANCE ON THE OST AND ACHIEVEMENT IN FORMAL SUBJECT AREAS WAS ALSO FOUND. THIS DOCUMENT APPEARED AS STUDY 3 IN SCHOOL ANXIETY AND COGNITIVE FUNCTIONING/ EXPLORATORY STUDIES, REPORT 4, IRCOPPS MIDWEST RESEARCH CENTER FOR PUPIL PERSONNEL SERVICES, ANN ARBOR, MICH., PP. 122-130. (PS)

ED013470

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SCHOOL ANXIETY AND COGNITIVE FUNCTIONING: EXPLORATORY STUDIES

University of Michigan

CG 000 927

IRCOPPS MIDWEST RESEARCH CENTER
FOR PUPIL PERSONNEL SERVICES

SCHOOL ANXIETY AND COGNITIVE FUNCTIONING: EXPLORATORY STUDIES

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THE UNIVERSITY OF MICHIGAN
1967

MIDWEST RESEARCH CENTER FOR PUPIL PERSONNEL SERVICE

July 1967

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PREFACE

This report is the fourth in a series of research monographs published by the IRCOPPS Midwest Research Center. A survey of Center activities plus a comprehensive synopsis of the Center's project reports may be found in the Center's 1967 Summary Status Report.

The present monograph reports the results of eight modular pilot studies conducted by various center staff. All research was supported by NIMH Grant #01428. Several of the studies have been presented, in abbreviated form, at various professional meetings and certain of the results have already appeared, or are due to appear, as short published articles.

Appreciation is expressed to the various staff associated with the production of these reports.

James A. Dunn
Director
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STUDY III

THE PREDICTION OF CREATIVITY AND ACADEMIC ACHIEVEMENT FROM A CONCRETE PERCEPTUAL-COGNITIVE TASK

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Prediction is the prime concern of science. In school psychology the problem often is the prediction of academic performance. Typically, IQ has been the best single achievement predictor. It has been argued, however, that cognitive performance is a function not only of "intelligence" but also of extensiveness of the response repertoire (knowledge) and of motivation (Liverant, 1960).

The contemporary approach has been to view "intellect" as multi- rather than uni-dimensional (See, for example, Thurstone, 1938; Guilford, 1956). In addition, evidence has been assembled suggesting a positive relationship between "style" of thinking (divergency) and achievement (Getzels & Jackson, 1962).

Contemporary thinking regarding intelligence has also been tremendously influenced by the work of Piaget, whose theory of intellectual development considers a child's acquisition of concepts in terms of the expansion or modification of cognitive structures.

The present investigation was a validation study of a task designed to yield scores on concept formation, recognition, and utilization. This study investigated the relative effectiveness of task scores vs. IQ as predictors of academic achievement. It also re-examined the correlations between task scores and IQ. Differences in convergent versus divergent response styles were also investigated.

The object sort task retionale suggested that response style would play a role in sorting fluency and flexibility and in verbal explanation of the sorting behavior. It was felt that the task might be tapping skills similar to those elicited by the Torrance tests of creative thinking (Torrance, et al., 1960), even though the latter require writing, drawing, or verbalization instead of object manipulation.

METHOD

Subjects were 99 upper-middle class elementary school children with a mean Stanford-Binet IQ of 126 (SD = 19). Ten males and ten females were drawn from each of grades 1, 2, 3, 4, and 6. One subject was eliminated from the sample because of incomplete results.

Dunn's Object Sorting Task (OST)[2] was the concept forma-

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[2]Personal Communication, James A. Dunn, The University of Michigan. The Object Sorting Task has been used in connection with research at the IRCOPPS Midwest Center; publication of these results is forthcoming.

tion-recognition task used. In this task, the subject is asked to sort six plastic objects into two dichotomous groups in as many different ways as possible. After each sort, he is asked to verbalize his sorting rationale. When the subject can produce no more sorts, exceeds 120 seconds, or exceeds the limit of allowable duplicate sorts, the divergent testing phase is terminated. He is then given, in order of difficulty, those possible correct sorts he failed to use and is asked, in each case, why the objects could be sorted in that way. This convergent testing, or concept recognition, phase is terminated when three trials are missed.

Stanford-Binet IQ scores and Wechsler Intelligence Scale for Children (WISC) Vocabulary raw scores were also obtained. WISC Vocabulary scores correlate .77 with Full Scale IQ (Wechsler, 1949). Achievement scores in reading, language, and arithmetic were obtained with the California Achievement Test Battery (CATB).

Torrance tests (Unusual Uses, Consequences, Situations, and Improvements), scored for ideational fluency, spontaneous flexibility, and originality, were given to subjects in grades 3-6. Comparable data were obtained for younger children (grades 1 and 2) by means of an adaptation of Getzel's and Jackson's (1962) Uses for Things test.

The OST was scored for:

(1) Number of positive verbal sorts;

(2) Mean verbalization;

(3) Proportion of positive sorts;

(4) Total verbal discrepancy;

(5) Mean speed of positive sorts; and

(6) Speed of first positive sort.

Correlation and multiple regression analyses were conducted on the University of Michigan IBM 7090 Computer.

GENERAL HYPOTHESES

The purpose of the study was to explore the validity of the Object Sorting Task as a measure of cognitive functioning in school children. This functioning was posited to be reflected in the child's demonstrated acquisition of, and facility in utilization of, classificatory concepts. Two kinds of validity, construct and predictive (Cronbach, 1960), were of interest. Thus, the investigation was concerned with IQ correlates of task performance and the ability of the OST to predict academic school learning.

It was expected that:

(1) Sorting fluency, speed, and quality of the verbal explanation of classificatory concepts would predict academic achievement;

(2) Number of positive sorts and mean verbalization scores would correlate with IQ; and

(3) OST fluency, flexibility, and originality would correlate with their respective Torrance scores.

DISCUSSION

Table 1 shows the Pearson product-moment correlations obtained among the relevant OST, IQ, and Torrance creativity variables.

Correlations at the .01 level of significance, ranging from .26 to .51, were found between the IQ indices and number of correct sorts, mean verbalization score, and mean sorting speed on the OST. Ten of the fifteen correlations between task scores and Torrance creativity scores were significant at the .01 level, the remainder at the .05 level.

TABLE 1

Intercorrelations of Object Sorting Task Scores, IQ, and Torrance Creativity Scores

	S-B IQ	WISC Voc.	Total Pos.	Mean Verb	Mean Spd.	1st Spd.	Verb Disc	T-Flex	T-Flu
WISC Voc	.32#								
Total Pos Sorts	.31#	.51#							
Mean Verb Score	.26#	.29#	.21#						
Mean Sort Speed	.30#	.28#	.03	.14					
Speed 1st Sort	.10	.44#	.38#	.27#	.33#				
Verbal Discrep	-.01	.36#	.52#	.12	.05	.32#			
Torrance Flex	.26#	.62#	.28#	.22*	.24*	.31#	.30#		
Torrance Fluency	.14	.71#	.29#	.19	.21*	.29#	.31#	.86#	
Torrance Orig	.24*	.74#	.33#	.20*	.28#	.34#	.33#	.85#	.92#

Significant, p = .01
* Significant, p = .05

Table 2 shows the results of multiple regression analysis. Achievement test performance (CATB) was predicted with Stanford-Binet IQ and Object Sorting Task scores. The former failed to emerge as a significant predictor. In fact, correlations of

the order of .14 to .18 were obtained between S-B IQ and the CATB scores. In contrast, fluency of correct dimensional sorting and sorting speed, together with verbal discrepancy (discrepancy in identifying both poles of the relevant conceptual dimension) predicted all three forms of academic achievement measured. Total number of positive sorts, mean speed of sorting, proportion of positive sorts, and verbal discrepancy score seemed to be the most salient indicators.

TABLE 2

Multiple Correlation Coefficients and Variance Accounted for by Object Sorting Task Variables In the Prediction of Academic Achievement

Dependent Variable	Predictor Variable	R (cum)	% of Var.
CATB: Reading	1. Total Positive Sorts	.44	.19
	2. Mean Sorting Speed	.49	.24
	3. Proportion of Positive Sorts	.53	.28
CATB: Arithmetic	1. Total Positive Sorts	.48	.23
	2. Verbal Discrepancy	.52	.27
	3. Mean Sorting Speed	.54	.29
	4. Mean Verbalization	.56	.31
CATB: Language	1. Total Positive Sorts	.45	.20
	2. Mean Sorting Speed	.48	.23
	3. Proportion of Positive Sorts	.51	.26
CATB: Total	1. Total Positive Sorts	.48	.23
	2. Mean Sorting Speed	.52	.27
	3. Proportion of Positive Sorts	.55	.30
	4. Verbal Discrepancy	.56	.32

CONCLUSIONS

All three hypotheses were generally supported. It was concluded that the Object Sorting Task can be used to tap diverse areas of cognitive functioning.

The surprisingly low relationship between S-B IQ and achievement scores found in the study may have been a function of the constricted variance of IQ within this homogeneously superior sample. The results obtained imply usefulness of the Object Sorting Task in detecting important differences in apparently homogeneous IQ groups.

The most interesting result was the strong predictive relationship between performance on the OST and achievement in formal subject areas of school learning. Formation and recognition of subtle classificatory concepts seemed to have considerable relevance to the cognitive functioning of children within the context of school achievement.

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